
New Combinations and Species-level Synonyms in *Swartzia* (Leguminosae: Papilionoideae)

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ABSTRACT. Based on herbarium and field studies of the Neotropical genus *Swartzia* Schreber (Leguminosae: Papilionoideae), seven new combinations are made: *S. colombiana* (R. S. Cowan) Torke, *S. emarginata* (Ducke) Torke, *S. glabrata* (R. S. Cowan) Torke, *S. kaieteurensis* (R. S. Cowan) Torke, *S. klugii* (R. S. Cowan) Torke, *S. peruviana* (R. S. Cowan) Torke, and *S. polita* (R. S. Cowan) Torke. All of these involve the recognition of former varieties as species due to the discovery of highly correlated morphological discontinuities, often corroborated by geographical and/or habitat separation, among the newly elevated species and closely related species. In addition, some 14 new species-level synonyms are proposed. Notable among these are: *S. aureosericea* R. S. Cowan (synonym of *S. macrosema* Harms), *S. benthamiana* var. *yatuensis* R. S. Cowan (synonym of *S. rosea* Martius ex Benth), *S. flaemingii* var. *cognata* R. S. Cowan (synonym of *S. polita*), *S. huallagae* D. R. Simpson (synonym of *S. calva* R. S. Cowan), *S. peremarginata* R. S. Cowan (synonym of *S. riedelii* R. S. Cowan), *S. racemosa* var. *major* R. S. Cowan (synonym of *S. klugii*), and *S. stipellata* R. S. Cowan (synonym of *S. anomala* R. S. Cowan).

RESUMEN. Basado en estudios de herbario y de campo del género neotropical *Swartzia* Schreber (Leguminosae: Papilionoideae), se hicieron siete combinaciones nuevas: *S. colombiana* (R. S. Cowan) Torke, *S. emarginata* (Ducke) Torke, *S. glabrata* (R. S. Cowan) Torke, *S. kaieteurensis* (R. S. Cowan) Torke, *S. klugii* (R. S. Cowan) Torke, *S. peruviana* (R. S. Cowan) Torke, y *S. polita* (R. S. Cowan) Torke. Todas éstas involucran el reconocimiento de variedades como especies, debido al descubrimiento de discontinuidades morfológicas altamente correlacionadas, a menudo corroboradas por separación geográfica y/o hábitat entre las especies recientemente elevadas y las especies cercanamente relacionadas. Adicionalmente, se proponen 14 nuevos sinónimos a nivel de especies. Entre los más sobresalientes están: *S. aureosericea* R. S. Cowan (sinónimo de *S. macrosema* Harms), *S. benthamiana* var. *yatuensis* R. S. Cowan (sinónimo de *S. rosea* Martius ex Benth), *S. flaemingii* var. *cognata* R. S. Cowan (sinónimo de *S.*

polita), *S. huallagae* D. R. Simpson (sinónimo de *S. calva* R. S. Cowan), *S. peremarginata* R. S. Cowan (sinónimo de *S. riedelii* R. S. Cowan), *S. racemosa* var. *major* R. S. Cowan (sinónimo de *S. klugii*), y *S. stipellata* R. S. Cowan (sinónimo de *S. anomala* R. S. Cowan).

Key words: Fabaceae, Leguminosae, Papilionoideae, Neotropics, *Swartzia*.

Ongoing herbarium studies of the large Neotropical tree genus *Swartzia* Schreber (ca. 180 species; Leguminosae: Papilionoideae) have brought to light a number of taxonomic and nomenclatural problems. Many of these have to do with the delimitation of closely related species (Torke, 2004). In the most recent monographic treatment of the genus, Cowan (1968) broadly defined a number of wide-ranging, highly variable species. Some of these definitions united multiple, now morphologically diagnosable entities, often treated as varieties by Cowan. Over the past several decades, dramatic growth in herbarium collections from Neotropical rainforest regions, particularly at the Missouri and New York Botanical Gardens, has allowed more detailed analysis of morphological variation in *Swartzia*. Despite this progress, few assessments of Cowan's species delimitations have appeared in the literature (see Mansano & Tozzi, 1999, 2001).

In preparation of upcoming publications on the molecular phylogenetics and biogeography of *Swartzia*, this article addresses nomenclatural problems that have become apparent during the course of the author's herbarium and field studies. Following the phylogenetic species concept of Wheeler and Platnick (2000; see also Eldridge & Cracraft, 1980; Nelson & Platnick, 1981; Nixon & Wheeler, 1990), highly correlated morphological discontinuities, especially in combination with geographical or ecological separation, are assumed to yield theoretically justifiable species delimitations. These delimitations should be thought of as testable hypotheses that, when exposed to additional data, particularly genetic data, may turn out to overestimate or, more commonly, to underes-

timate the actual number of diagnosable species in a particular group. New descriptions of the species recognized below are intended in future revisionary works.

- 1. *Swartzia anomala*** R. S. Cowan, Fl. Neotrop. Monogr. 1: 206–207. 1968. TYPE: Guyana. Upper Takutu–Upper Essequibo: basin of Kuyuwini River, ca. 150 mi. from mouth, 21–26 Nov. 1937 (fr), A. C. Smith 2591 (holotype, US 1776793; isotypes, MO, NY).

Swartzia stipellata R. S. Cowan, Fl. Neotrop. Monogr. 1: 211. 1968. Syn. nov. TYPE: Brazil. Roraima: Caracarái, Rio Branco, 20 Sep. 1943 (fl), A. Ducke 1366 (holotype, US 2248068; isotypes, A not seen, F, MG not seen, NY, R not seen).

Molecular data (Torke, unpublished) and morphology support the monophyly of a group composed of the white-flowered species of *Swartzia* sect. *Possira* (Aublet) DC. as defined by Cowan (1968). As treated here, *S. anomala* is unique within this group in the combination of unifoliate leaves with the midvein raised adaxially and prominent linear to awl-shaped stipules and stipels. At the time of his monograph, Cowan (1968) knew this species from only six collections, five of which, with relatively large flower buds and flowers, he assigned to *S. stipellata*. Although he did not mention a close relationship between *S. anomala* and *S. stipellata*, the fruiting type collection of the former and the flowering type of the latter differ obviously only in the leaflets smaller and the calyx adaxially pubescent in the type of *S. anomala*. Subsequent collections show that leaflet and flower size vary extensively, but apparently continuously, in a single species distributed primarily from southern Guyana to the central Rio Negro region of Brazil, with a single collection taken from the Rio Madeira basin of Brazil, near the border of Amazonas and Rondônia. Pubescence on the adaxial surface of the calyx occurs sporadically across the distribution of *S. anomala*.

Specimens examined. BRAZIL. **Amazonas:** Rio Negro, São Luiz, betw. Manaus & São Gabriel da Cachoeira, L. Alencar 139 (NY); Rio Negro, Tapuruquara, betw. Manaus & São Gabriel da Cachoeira, L. Alencar 282 (NY); Rio Negro, Temendani, L. A. Maia et al. 282 (NY); Rio Negro, Ilha Providência to Ilha Arara, G. T. Prance et al. 16228 (MO, NY, US); N margin of Rio Aracá, just above Igarapé Sauadaua, G. T. Prance et al. 29857 (MO, NY, US); Rio Negro, near mouth of Rio Aracá, P. Acevedo-Rodriguez et al. 8067 (US); along Rio Preto (tributary of Rio Negro), 165 km from Barcelos, P. Acevedo-Rodriguez et al. 8426 (NY, US); Rio Negro, 120 km above Barcelos, M. T. Madison et al. 6164 (NY, US); Mun. Barcelos, Rio Jauari, after confl. with Igarapé Pretinho, J. A. Silva 283 (MO, NY, US); Rio Aracá, 13 hours from Barcelos, J. A. Silva 382 (MO, NY, US);

Barcelos, A. Ducke 7167b (US); Mun. Humaitá, Humaitá–Porto Velho rd., km 60, margin of Igarapé São João de Agua Clara, L. O. A. Teixeira et al. 109 (MO, NY, US); Mun. São Gabriel da Cachoeira, rt. margin of Rio Negro, near mouth of Rio Marié, C. A. Cid Ferreira et al. 9356 (MO, NY, US); Mun. Santa Isabel do Rio Negro, São Tomé, C. A. Cid Ferreira et al. 9322 (MO, NY, US). **Roraima:** Dormida, foothills of Serra Dalua, G. T. Prance et al. 9255 (NY, US); Mun. Caracarái, Caracarái, Rio Branco, A. Ducke 1331 (NY, US); North Perimeter rd. (BR-210), 9 km from jct. with Manaus–Caracarái rd. (BR-174), near Novo Paraíso, C. A. Cid Ferreira et al. 9207 (MO, NY, US); BR-174, Km 530–540, C. A. Cid Ferreira et al. 9257 (MO, NY, US); BR-174, betw. Caracarái & Rio Branco, L. Coradin & M. dos R. Cordeiro 1050 (NY). GUYANA. **Upper Takutu–Upper Essequibo:** basin of Kuyuwini River (Essequibo River tributary), ca. 241 km from mouth, A. C. Smith 2591 (MO, NY, US); Kuyuwini Landing, Kuyuwini River, M. J. Jansen-Jacobs et al. 2443 (BBS, MO, NY, US); Kassikaityu River, 0–3 km E of landing at terminus of trail from Kuyuwini River, D. Clarke 4836 (BRG, NY, US); S Rupununi Savanna, Wakadanawa Savanna, M. J. Jansen-Jacobs et al. 5406 (MO, NY, US); S Kassikaityu River, 0–6 km N and E of camp, D. Clarke et al. 8803 (BRG, NY, US); Acarai Mountains, Sipu River, 7–10 km from confl. with Essequibo River, T. W. Henkel et al. 5233 (BRG, MO, NY, US).

- 2. *Swartzia calva*** R. S. Cowan, Proc. Biol. Soc. Wash. 86: 454–455. 1973. TYPE: Peru. Loreto: Maynas, Dist. Alto Nanay, trail to Pisco, 4 km from Santa Maria de Nanay, 130 m, 9 Mar. 1968 (fl), J. Schunke V. 2509 (holotype, US 2615454; isotypes, F, NY).

Swartzia huallagae D. R. Simpson, Phytologia 30: 313–315. 1975. Syn. nov. TYPE: Peru. San Martín: Mariscal Cáceres, Dist. Tocache Nuevo, Caserío de Cedro, rt. bank of Río Huallaga, 8 Oct. 1970 (fl), J. Schunke V. 4490 (holotype, F; isotypes, G not seen, US, USM).

In his description of *Swartzia huallagae*, Simpson (1975) appears to have been unaware of the publication of the name *S. calva* by Cowan in 1973. Simpson cited the type collection of *S. calva* (J. Schunke V. 2509) as a paratype of *S. huallagae* in the same publication. There are no taxonomically significant differences between the type collections of the two names. *Swartzia calva* occurs in non-flooded lowland Amazonian rainforests in and near the foothills of the Andes Mountains from Pastaza Province of Ecuador south to Huanuco Region of Peru and the Brazilian state of Acre. *Swartzia calva* and its close relative *S. reticulata* Ducke are unique among species of *Swartzia* in having completely glabrous parts. Both species are also characterized by coriaceous leaflets with conspicuous reticulate venation and by large (8–20+ × 4–6.5 cm) woody, more or less elliptical fruits. *Swartzia calva* differs from *S. reticulata* most obviously in its narrower leaflets, which are mostly more than twice as long as

wide (vs. twice as long or less), and in having the style nearly as long as the ovary (vs. much shorter).

Specimens examined. BRAZIL. **Acre:** Mun. Tarauacá, Colocação Morada Nova, Res. Indígena Praia do Carapaná, lt. margin of Rio Tarauacá, basin of upper Rio Juruá, *M. Silveira et al.* 1149 (NY); Seringal Universo, *D. C. Daly et al.* 8777 (NY). ECUADOR. **Pastaza:** Cant. Pastaza, Pozo Petrolero "Corrientes" de UNOCAL, 35 km SE of Curaray, *S. Espinoza* 310 (MO, NY); Curaray (Jesús Pitishka), near airstrip, *G. Harling & L. Andersson* 17696 (GB, MO). PERU. **Amazonas:** Monte Virgen, 1 km below La Poza, E bank of Río Santiago, *F. Dominguez-Peña* 120 (MO); Río Santiago, 800 m before Caterpiza, E bank of Quebrada Caterpiza, Monte Virgen, *V. Huashicat* 361 (MO); Huambisa, valley of Río Santiago, ca. 65 km N of Pinglo, Quebrada Caterpiza, *V. Huashicat* 273-A (MO). **Huánuco:** Prov. Leoncio Prado, Dist. Aucayacu, UTCF, *R. Lao* 5010 (MO). **Loreto:** Prov. Alto Amazonas, Puranchim, Río Sinchiyacu, *W. H. Lewis et al.* 13293 (USM); Andoas, lt. bank of Río Pastaza, *R. Vazquez & N. Jaramillo* 1892 (MO); Prov. Maynas, Res. Nac. Pacaya-Samiria, Pithecia Biol. Stat., Río Samiria, *C. Grández & N. Jaramillo* 1971 (MEXU); Nauta, rd. to Iquitos, *R. Vazquez & N. Jaramillo* 8645 (AMAZ, MEXU). **San Martín:** Prov. Mariscal Cáceres, Fundo Curareland, near Tinanta, 20 km NW of Tocache, *A. H. Gentry et al.* 25689 (AMAZ, US, USM); Dist. Campinilla, rd. to Las Achiras, SW of Caserío de Sión, *J. Schunke V.* 3550 (NY, US); Dist. Tocache Nuevo, Balsa Probanda, rt. bank of Río Huallaga, *J. Schunke V.* 4442 (MO, NY, US); Quebrada de la Cachiyacu, tributary of Quebrada de Huaquisha, *J. Schunke V.* 8511 (MO, US, USM).

3. *Swartzia colombiana* (R. S. Cowan) Torke, comb. et stat. nov. Basionym: *Swartzia brachyrachis* var. *colombiana* R. S. Cowan, Fl. Neotrop. Monogr. 1: 192, fig. 1a. 1968. Syn. nov. TYPE: Colombia. Valle del Cauca: Quebrada Aguadulce, Bahía de Buenaventura, 0–10 m, 11 Nov. 1945 (fr.), *J. Cuatrecasas* 19728 (holotype, US 2220845; isotype, F).

Five of the ca. 30 taxa that make up the white-flowered portion of *Swartzia* sect. *Possira* were treated by Cowan (1968) as varieties of a single highly variable, wide-ranging species, *S. brachyrachis* Harms. At least three of these taxa are morphologically distinct and are geographically isolated from each other and from other varieties of *S. brachyrachis* and thus should be recognized as separate species. The first of these, *S. colombiana* is the only representative of the white-flowered *Possira* group to be found west of the Andes Mountains. It inhabits lowland rainforests along the Pacific Coast of Colombia in Chocó Department south to Valle del Cauca. One collection was taken from north-central Antioquia, Colombia.

Swartzia colombiana is probably most closely related to *S. peruviana* (R. S. Cowan) Torke, another species treated as a variety of *S. brachyrachis* by Cowan (1968). Both species have 1- to 3(5)-foliolate

leaves and differ from other members of the *S. brachyrachis* assemblage in having relatively minute trichomes (mostly less than 0.2 mm long), shorter pedicels (less than 10 mm long), and smaller flowers and flower buds (the buds less than 6 mm diam.). They differ from the typical variety of *S. brachyrachis* in the pedicels and buds densely appressed-pubescent (vs. glabrous) and in shorter stipels (less than 1 mm long), bracts (less than 1 mm long), stipules (mostly less than 2 mm long), and fruit stipes (not more than 10 cm long). *Swartzia colombiana* can be easily separated from *S. peruviana* by its nearly glabrous abaxial leaflet surface (vs. densely golden pubescent in *S. peruviana*). Other unusual features of *S. colombiana* include adaxially prominent, strongly ascending secondary, intersecondary, and tertiary leaflet venation; a deflexed leaflet margin; and raised ridges along one or both sutures of the fruit.

Specimens examined. COLOMBIA. **Antioquia:** betw. Providencia & Quebrada La Tirana, 28 km SW of Zaragoza, valley of Río Anorí, near confl. of Quebrada La Tirana & Río Anorí, ca. 3 km upriver from Planta Providencia, *W. S. Alverson et al.* 207 (MO). **Chocó:** near Río Tuado, 12 km W of Istmo de San Pablo, ca. 28 km W of Las Animas, *A. H. Gentry & E. Renteria* 23950 (MO, NY, US); Quibdo–Tutunendo rd., ca. 3 km W of Tutunendo, *A. H. Gentry et al.* 30176 (MO). **Valle del Cauca:** Río Yurumanguí, Veneral, *J. Cuatrecasas* 15910 (US); Mun. Buenaventura, Bahía de Buenaventura, Quebrada de Buenaventura, *J. Cuatrecasas* 19947 (US); Bajo Calima, Carton de Colombia "El Dindo," *H. Murphy* 546 (MO, US); Bajo Calima, ca. 15 km N of Buenaventura, "new" Dindo area, *A. H. Gentry et al.* 56749 (MO, NY); Bajo Calima, Pulpapel/Buenaventura Concession, La Gasolina hwy., *M. Monsalve B.* 1586 (MO); Bajo Calima, betw. Las Quebradas San Joaquín & Aguas Claras, *I. Cabrera R.* 3839 (MO); Bajo Calima Concession, ca. 15 km NW of Buenaventura, 1 km past Luchin–Lijal rd. on Luchin rd., *D. Faber-Langendoen & E. Renteria* 1205 (MO); Bajo Calima Concession, ca. 25 km NW of Buenaventura, ca. 9 km NW of San Isidro jet. on "Canalete," near gate, *D. Faber-Langendoen & J. A. Hurtado* 1683 (MO); Bajo Calima Concession, Juanchaco Palmeras area, ca. 10 km NW of Buenaventura, *A. H. Gentry et al.* 57024 (MO); Bahía de Malaga, near mouth of Quebrada La Sierpe, *A. H. Gentry et al.* 40431 (MO).

4. *Swartzia emarginata* (Ducke) Torke, comb. et stat. nov. Basionym: *Swartzia sericea* var. *emarginata* Ducke, Arq. Inst. Biol. Veg. 2(1): 44. 1935. TYPE: Brazil. Amazonas: São Paulo de Olivença, Rio Solimões, 3 Oct. 1931 (fl.), *A. Ducke* 24238 (holotype, RB not seen; isotypes, K not seen, RB not seen, S not seen, U not seen, US).

Ducke (1935) and Cowan (1968) considered *Swartzia emarginata* to be a variety of *S. sericea* Vogel. Among the apetalous *Swartzia* (series *Tounateae* Benthham), only *S. emarginata* and *S. sericea* have

the combination of the adaxial surface of the calyx densely sericeous and the filaments of the large stamens pubescent. In the available collections, *S. emarginata* and *S. sericea* differ consistently in the size of the pedicels (3–4.5 mm long in *S. emarginata*, 6–10 mm long in *S. sericea*), the flower buds (3.5–4 × 4.5–5 mm in *S. emarginata*, 6–7.5 × 6.5–8 mm in *S. sericea*), the flowers (e.g., the ovary 2.5–3 mm long in *S. emarginata*, 4.5–6 mm long in *S. sericea*), the number of leaflets (7- to 9-jugate in *S. emarginata*, 4- to 6-jugate in *S. sericea*), and the length of the trichomes on the inflorescence axes (less than 0.3 mm in *S. emarginata*, often greater than 0.3 mm in *S. sericea*). In addition, the two species are separated geographically, with *S. emarginata* known only from the vicinities of Fonte Boa and São Paulo de Olivença on the Rio Solimões in the Brazilian state of Amazonas, and *S. sericea* more broadly distributed in the basin of the Rio Negro, from its mouth near Manaus, Brazil, to upper tributaries in the Venezuelan state of Amazonas and adjacent Colombia, with the type collection (probably lost) reportedly taken in French Guiana.

Specimens examined. BRAZIL. **Amazonas:** Mun. Fonte Boa, Grecí, Paraná do Mamupina (tributary of lt. margin of Paraná Mineruá), *C. A. Cid Ferreira et al.* 8369 (MO, NY, US); Mun. São Paulo de Olivença, rd. to Bonfim, just outside of São Paulo de Olivença, basin of Rio Solimões, *H. C. de Lima et al.* 2784 (MO, NY, US).

5. *Swartzia glabrata* (R. S. Cowan) Torke, comb. et stat. nov. Basionym: *Swartzia brachyrachis* var. *glabrata* R. S. Cowan, Fl. Neotrop. Monogr. 1: 192, fig. 40a, b. 1968. TYPE: Suriname. Brokopondo: 0.5 km SW of Savanna I, Tafelberg Mountain, 17 Sep. 1944 (fr), *B. Maguire* 24779 (holotype, NY; isotypes, A not seen, BR not seen, G not seen, U not seen, UC not seen, US).

Close morphologically to the typical variety of *Swartzia brachyrachis*, *S. glabrata* has similarly large trichomes (often more than 0.3 mm long) and flowers (pedicels 1.5–2.5 cm, flower buds 6–8 mm diam., ovary stipe 6–10 mm, ovary 6–7 mm, style ca. 2 mm). It consistently differs from the typical variety in the pedicels, flower buds, and abaxial calyx surface densely appressed-pubescent (vs. essentially glabrous) and the stipules, stipels, and bracts relatively small and inconspicuous (generally less than 1 mm long). The 1- or 2-jugate leaves are also distinctive in the leaflets essentially glabrous (though sometimes with sparse pubescence on the midrib abaxially) and the venation conspicuously raised on both leaflet surfaces. In addition to these differences, *S. glabrata* appears to be geographically isolated from the typical

variety of *S. brachyrachis* of the central and eastern Amazon basin of Brazil, as well as from other members of the *S. brachyrachis* assemblage by a significant geographic disjunction. It occurs in a variety of habitats, including savannas and rainforests, below 800 m elevation in the Pakaraima Mountains and adjacent lowlands of western Guyana, northern Roraima, Brazil, southeastern Bolívar, Venezuela, east to Mount Tafelberg and surrounding lowlands in western Suriname, and south to the Serra Acarai Mountains of southern Guyana.

Specimens examined. BRAZIL. **Roraima:** Serrinha, Rio Mucajaí, *G. T. Prance et al.* 4215 (NY); Vila Pacaraima, Rio Surumu, Boa Vista–Pacaraima rd. (BR-174), *S. Almeida & M. Cordeiro* 622 (MO). GUYANA. **Potaro-Siparuni:** Iwokrama Forest Reserve, Burro-Burro River, at confl. with Siparuni River, *P. Mutchnick & B. Allicock* 540 (BRG, NY, US); Iwokrama Forest Reserve, Burro-Burro River, 2.82 km from Whitewater Base Camp, *K. M. Redden et al.* 1136 (US). **Upper Demerara-Berbice:** Upper Demerara River, *G. S. Jenman* 4126 (BRG). **Upper Takutu-Upper Essequibo:** Acarai Mountains, near Chodikar Mountain, *D. Clarke* 2972 (BRG, NY); Acarai Mountains, height of land betw. drainage of Mapuera River (Trombetas River tributary) & Shodikar Creek (Essequibo River tributary), *A. C. Smith* 2993 (MO, NY); Acarai Mountains, Sipu River, 7–10 km from confl. with Essequibo River, *T. W. Henkel et al.* 5209 (BRG); British Guiana/Brazil border, Chodikar Trail, near Kukui Creek, *Forest Dept. of British Guiana* 7673/658 (NY); Essequibo River, 4 km N of Konashen Rapids & Mount Zibingatzako, *D. Clarke* 3226 (BRG, NY); Rupununi area, new rd. to Lethem, to 25 km past Surama village entrance, *P. Acevedo* 3434 (BBS, BRG, NY). SURINAME. **Brokopondo:** Tafelberg Mountain, Table Mountain, Savanna No. 1, *B. Maguire* 24306 (MO, NY). VENEZUELA. **Bolívar:** Mun. Roscio, “El Abismo,” small range S of Río Samay, N of Río Icabaru, *B. K. Holst & R. Liesner* 2435 (MO, NY, US).

6. *Swartzia kaieteurensis* (R. S. Cowan) Torke, comb. et stat. nov. Basionym: *Swartzia lamellata* var. *kaieteurensis* R. S. Cowan, Fl. Neotrop. Monogr. 1: 133. 1968. TYPE: Guyana, Potaro-Siparuni: Kaieteur Savanna, Potaro River, Sep.–Oct. 1881 (fl), *G. S. Jenman* 1048 (holotype, K not seen; isotype, BRG).

Swartzia kaieteurensis was treated as a variety of *S. lamellata* Ducke by Cowan (1968), but it is quite distinct morphologically and geographically from the typical variety of that species. The leaflets of *S. kaieteurensis* are more coriaceous than those of *S. lamellata*, the margins are deflexed (plane in *S. lamellata*), and the apex is long-acuminate (cuspidate in *S. lamellata*). The flowers and flower buds of *S. kaieteurensis* are about twice as large (7–8 mm wide) as those of *S. lamellata* (3.5–5 mm wide), and the fruit is verrucose rather than coarsely rugose. *Swartzia kaieteurensis* has been collected in Kaieteur Falls National Park in the Potaro-Siparuni District of

Guyana and near Imbaimadai in the Cuyuni-Mazaruni District. It occurs in forests on sandy soils below 1000 m elevation in the Pakaraima Mountains of Guyana. The nearest collection of *S. lamellata*, a species restricted to the central Amazon Basin, was taken more than 600 km to the south in the Brazilian state of Amazonas.

Other close relatives of *Swartzia kaieteurensis* include *S. rosea* Martius ex Benth and *S. cupavenensis* R. S. Cowan. *Swartzia kaieteurensis* differs from both of these species in having bracteolate pedicels and slightly longer than wide, distinctly verrucose fruits (vs. usually more than twice as long as wide and smooth to irregularly papillate or tuberculate). The geographic distribution of *S. kaieteurensis* is separated from those of *S. rosea* and *S. cupavenensis* in the Venezuelan state of Amazonas by the intervening mountains of the Guyana Plateau.

Specimens examined. GUYANA. **Cuyuni-Mazaruni:** vic. of Imbaimadai, Mazaruni River, 1.45 km S of Partang River Base Camp, K. M. Redden *et al.* 1245 (US); vic. of Imbaimadai, on top of tepui, 1.64 km NE of base camp, K. M. Redden *et al.* 1409 (US); Pakaraima Mountains, Imbaimadai, Karowrieng River, toward waterfall 3.73 km E of Base Camp 1, bordering Karowrieng Creek, K. M. Redden *et al.* 1490 (US); Pakaraima Mountains, Mazaruni River, NW of Chi-Chi Falls, base of tepui behind Base Camp 2, K. M. Redden *et al.* 1640 (US). **Potaro-Siparuni:** Kaieteur National Park, N of Menzie's Landing, N of Kaieteur Falls, J. J. Pipoly & G. Gharbarran 9983 (BRG, MO); Kaieteur National Park, NE of end of airstrip, at headwaters of Korume Creek, C. L. Kellogg *et al.* 1320 (BRG); along trail from Kaieteur Falls to Tukeit, R. S. Cowan & T. R. Soderstrom 2012 (MO); Kaieteur Savanna, Potaro River, G. S. Jenman 1048 (BRG).

7. *Swartzia klugii* (R. S. Cowan) Torke, comb. et stat. nov. Basionym: *Swartzia racemosa* var. *klugii* R. S. Cowan, Fl. Neotrop. Monogr. 1: 129, 1968. TYPE: Peru, Loreto: Mishuyacu, near Iquitos, 100 m, Oct.–Nov. 1929 (fl), G. Klug 601 (holotype, US; isotype, NY).

Swartzia racemosa var. *major* R. S. Cowan, Fl. Neotrop. Monogr. 1: 130, 1968. Syn. nov. TYPE: Brazil, Amazonas: Mello Franco, 31 Aug. 1943 (fl), P. H. Allen 3095 (holotype, NY; isotypes, MO; fragment, US).

Cowan's (1968) treatment of *Swartzia klugii* as a variety of *S. racemosa* Benth is no longer justified, considering the substantial morphological differences and the rather large geographical separation between the two species. *Swartzia klugii* is distributed primarily in non-inundated Amazonian forests in the Loreto region of Peru and in Caquetá and Amazonas, Colombia, with a single collection from adjacent Brazil. It differs from *S. racemosa*, which occurs principally in seasonally inundated forests near the mouth of the Amazon River and

nearby tributaries in northeastern Pará, Brazil, in the stipules very small, generally less than 0.5 mm long (vs. 8–15 mm long, though often caducous), the leaflets abaxially glabrous (vs. conspicuously canescent from a dense covering of minute whitish trichomes), the leaflet midrib prominently raised adaxially (vs. submerged and sunken in a furrow), the tertiary and higher order venation conspicuously raised on both leaflet surfaces (vs. submerged to slightly raised and inconspicuous), the inflorescence axes glabrescent to sparsely pubescent (vs. densely appressed-pubescent), and the ovary stipe usually more than twice as long as the ovary (vs. less than twice as long).

Cowan (1968) assigned Colombian and Brazilian collections of *Swartzia klugii* to *S. racemosa* var. *major*, citing longer petioles and larger flower buds than in *S. racemosa* var. *klugii*. While it is true that the type collection of the former name has unusually large flower buds for the species and also atypically thick inflorescence axes, subsequent collections with morphology intermediate between that of the type specimens of the two varietal names suggests that variation in these characters is continuous. Field observations by the author in Peru revealed extensive variation in petiole length within populations, often on a single individual. Petiole length appears to be highly correlated with leaflet size, which in turn is correlated with light exposure and plant age.

Specimens examined. COLOMBIA. **Amazonas:** W side of Río Caquetá, betw. Villa Azul & Peña Roja, A. van Dulmen AvD286 (NY); Río Apaporis, betw. Río Cananari & Río Pacoa, H. García-Barriga 13870 (NY, US); Río Apaporis, mouth of Río Pacoa, R. E. Schultes & I. Cabrera 12557 (US); Río Apaporis, Soratama, near mouth of Río Cananari, R. E. Schultes & I. Cabrera 14824 (NY); Mun. Leticia, Corr. Puerto Santander, Río Caquetá, mouth of Río Meta, Finca El Refugio, 135 km from Araracuara, D. Cárdenas *et al.* 4578 (NY); Mun. Tarapacá, Corr. Tarapacá, Parq. Nac. Nat. Amayecayacu, Lorena Sect., Río Cotuhé, A. Rudas *et al.* 5190 (MO). **Caqueta:** Río Yari, 10 km from mouth, D. Cárdenas & F. Andoque 4323 (MO); vic. of Araracuara, El Engaño, 2–3 km above outlet, D. Restrepo & A. Matapi 598 (NY). PERU. **Loreto:** Quebrado Tahuayo, above Tamishiyaco, T. B. Croat 19875 (MO, US); Río Tambor-yaca, T. B. Croat 20566 (MO, NY); Prov. Maynas, ca. 7 km E of oil palm plantation at Río Manilí, ca. 20 m above level of Quebrada Paparo, K. Ruokolainen *et al.* 5091 (USM); Cahuide, Río Itaya, R. Vásquez & N. Jaramillo 5738 (AMAZ, MO, USM); Mamepo, Río Yubinetto (tributary of Río Putumayo), C. Haxaire 858 (MO); Quebrada Yanamono, Explorama Tourist Camp, Río Amazonas, betw. Indiana & mouth of Río Napo, R. Vásquez & N. Jaramillo 6344 (MO); Dist. Alto Nanay, Río Nanay, Quebrada de Anguilla, M. Rimachi Y. 3471 (AMAZ); Dist. Las Amazonas, Quebrada Sucursari (tributary of Río Napo), A. H. Gentry *et al.* 54330 (MO); Explornapo Camp, near Sucursari, Río Napo, J. Pipoly *et al.* 13473 (MO, USM); Llachapa, Explornapo Camp, Río Napo, R. Vásquez & N. Jaramillo 3777 (MO); Dist. Iquitos, Allpahuayo-Mishana Res. Zone, Exp. Stat. of IIAP, R. Vásquez & N. Jaramillo

14765 (MO, NY): Yuto Village, Yuto Lake, Río Nanay, Allpahuayo-Mishana Res. Zone, *R. García et al. 1630* (AMAZ); Mishana, Río Nanay, halfway between Iquitos and Santa Maria de Nanay, *A. H. Gentry et al. 26140* (US, USM); Río Nanay, close to village of Mishana, *K. Ruokolainen et al. 808* (AMAZ, USM); Río Nanay, betw. Mishana and Puerto Almendras, *A. H. Gentry et al. 21083* (USM); Río Nanay, settlement of Nina Runy, *J. Ruiz 762* (AMAZ, MO); Puerto Almendras, property of the Univ. de la Amazonía Peruana, Río Nanay, above Iquitos, *B. M. Torke et al. 260* (AMAZ, MO); Mishuyacu, near Iquitos, *G. Klug 574* (NY, US); Pangana, near Quebrada, above Aucaya, *S. McDaniel & M. Rimachi Y. 30241* (MO, NY); Río Momón (tributary of Río Nanay), trail from comm. “Grau Second Zone” to Quebrada de Leonidas, *M. Rimachi Y. 3442* (AMAZ); Río Momon, trail to San Miguel ranch, 1 hour from port of Bellavista, *M. Rimachi Y. 8037* (MO, NY, US, USM); Dist. Nauta, Río Marañón, Quebrada de Sapira, comm. of Florida, 8 km above Nauta, *M. Rimachi Y. 4352* (AMAZ, NY, US); Dist. Sangento Lores, Constanca Norte, Shapajillal, *R. Vásquez et al. 22988* (MO); Prov. Requena, Saquena, Río Ucayali, Quebrada de Aucayacu, San Pedro, above Genaro Herrera, *M. Rimachi Y. 4304* (MO).

8. *Swartzia macrosema* Harms, Notizbl. Bot. Gart. Berlin-Dahlem 9: 970. 1926. TYPE: Peru, Loreto: Prov. Alto Amazonas, Río Marañón, at mouth of Río Santiago, Pongo de Manseriche, 1924 (fl), *G. Tessmann 4217* (lectotype, designated by Cowan, 1968: 50. S not seen; isolypes, F, NY).

Swartzia aureosericea R. S. Cowan, Brittonia 37: 301–302. 1985. Syn. nov. TYPE: Ecuador: Zamora-Chinchipe: just N of Yantaza, 700 m, 16 Nov. 1982 (fl), *T. D. Pennington & G. Tenorio 10754* (holotype, K not seen; isotype, US).

Cowan (1985) distinguished *Swartzia aureosericea* from its nearest relative, *S. macrosema*, based on the type collection’s relatively larger, differently shaped stipules, leaflets, and bracts; longer petioles; greater number of secondary veins in the leaflets; and aureosericeous leaflet undersurface. Inspection of available collections assignable to either name from throughout the range of the complex exposed nearly continuous variation in all of these characters, with little or no geographic correlation. In living individuals examined by the present author in Peru, the aureosericeous pubescence on the leaflet undersurface was most conspicuous in relatively young leaflets and was often caducous in older leaflets. Based on these observations, it is suggested that there is a single species, *S. macrosema*, occurring in non-flooded, lowland and premontane rainforests near the base of the Andes Mountains from Putumayo Department of Colombia south to Amazonas region of Peru.

Specimens examined. COLOMBIA. **Putumayo:** margins of Río Guamués, betw. San Antonio & mouth, *J. Cuatrecasas 11224* (US). ECUADOR. **Morona-Santiago:** Río Cayes,

10 km W of Río Zamora, 5 km SW of (Río?) Gualaquiza, *M. A. Baker 6853* (MO, NY); Bomboiza, 17 km SE of Río Gualaquiza, *J. Zaruma 342* (MO, NY); Bomboiza, Salesiana Shuar Mission, *D. Neill et al. 7404* (MO, NY). **Napo:** 8 river km above Puerto Misahualli, rt. bank of Río Napo, Res. Flor. Jatun Sacha, *J. Zaruma 771* (MO, NY). **Pastaza:** Mera, *E. Asplund 18819* (NY, S). **Zamora-Chinchipe:** lt. bank of Río Nangaritza, near Miasi, *J. Jaramillo 14288* (MO, NY); Cant. El Pangui, Cord. del Cóndor, valley of Río Quimi, W of ridge, *D. Neill et al. 12935* (MO); Cant. Nangaritza, comm. Shuar Zarentzag, near confl. of Río Numpatakaine & Río Tzenganga, *W. Quizhpe et al. 473* (MO). PERU. **Amazonas:** Prov. Bagua, Aramango, *F. Wojtkowski 5626* (MO, US); rt. bank of Río Santiago, 2–3 km above mouth, *J. J. Wurdack 2403* (NY, US, USM); Dist. Imaza, comm. Yamayakat, along Río Marañón, opposite Imacita, trail to Putuin, *B. M. Torke et al. 250* (HUT, MO); comm. Yamayakat, Quebrada Kusú-Chapi, *R. Vásquez et al. 19393* (MO); Aguaruna comm. Kusú-Listra, Cerro Apág, margin of Quebrada Kusú, *C. Díaz et al. 8621* (MO, USM); Tayu Mujaji, comm. Wawas, *R. Vásquez et al. 24619* (MO); Putum-Shimulaz rd., *R. Vásquez et al. 21280* (HUT, MO, USM); Bagua–Imacita rd., betw. Chiriaco & Imacita, *B. M. Torke et al. 251* (HUT, MO).

9. *Swartzia peruviana* (R. S. Cowan) Torke, comb. et stat. nov. Basionym: *Swartzia brachyrachis* var. *peruviana* R. S. Cowan, Fl. Neotrop. Monogr. 1: 194. 1968. Syn. nov. TYPE: Peru, Ucayali: Prov. Coronel Portillo, Dist. Calleria, forestry breeding area, Km 4, 8 July 1963 (fl), *R. L. Majin 55* (holotype, US 2407941; isolypes, NY, USM).

With a dense mat of minute, appressed golden trichomes (each less than 0.2 mm long) completely concealing the abaxial leaflet surface and with its particularly small flowers (e.g., pedicels 3.5–5 mm, flower buds ca. 3–4 mm diam., ovary stipe 2.5–4 mm, ovary ca. 2.5–3 mm, style ca. 1–1.5 mm), *Swartzia peruviana* is the most distinct species in the *S. brachyrachis* assemblage. The venation, submerged to slightly raised on the adaxial leaflet surface and relatively inconspicuous on the abaxial surface, is also characteristic. In addition, the species differs from the typical variety of *S. brachyrachis* in its densely pubescent inflorescence axes, pedicels, and flower buds; its much smaller stipules, stipels, and bracts (all less than 1 mm long vs. 1–several mm long); and its fruit, with the persistent style less than 2 mm long and the stipe not more than 10 mm long and less than 1 mm thick in the center.

Swartzia peruviana is a large canopy tree known mostly from non-inundated Amazonian rainforests of the Loreto and Ucayali regions of Peru to Pando and Beni Departments of Bolivia. It may also occur in poorly collected adjacent areas in western Brazil. It was encountered by the present author growing on nutrient-poor lateritic clay soils in the Basin of the Río Beni in Bolivia. The species appears to be geographically separated from other members of the

S. brachyrachis assemblage, which are found in the Guyana shield and in central and eastern parts of the Amazon basin.

Specimens examined. BOLIVIA. **Beni:** Cachuela Esperanza, Río Beni, "Yuta" rd., *B. Maguire* 125 (NY); Prov. Vaca Diez, 17 km E of Riberalta on rd. to Guayaramerin, then 2 km NE on old rd. to Cachuela Esperanza, *B. M. Torke et al.* 243 (MO, USZ). **Pando:** Prov. Abuná, Encampment 18 to Democracia, 18 km N of Barraca San Juan de Nuevo Mundo, N of Río Orton, *L. Vargas et al.* 608 (LPB); ca. 5 km NE of rubber center of Ingavi & Río Orton, *L. Vargas & R. Foster* 754 (USZ); Prov. Manuripi, 12 km W of Conquista-Trampolín, *St. G. Beck et al.* 20148 (LPB). PERU. **Loreto:** Prov. Maynas, Dist. Iquitos, Allpahuayo-Mishana Res. Zone, Exp. Stat. of IIAP, *R. Vásquez et al.* 18343 (AMAZ, MEXU, MO); Allpahuayo-Mishana Res. Zone, Iquitos–Nauta rd., Km 20, ca. 35 km SW of Iquitos, *A. H. Gentry et al.* 56106 (MO, USM); Iquitos, Itaya Plantation, Iquitos–Nauta rd., Km 42, *R. Vásquez & T. Soto* 8318 (MO); Prov. Requena, Dist. Saquena, Río Ucayali, trail from Quebrada Aucayacu, above Genaro Herrera, *Manuel Rimachi Y.* 4249 (AMAZ, MO, NY, USM). **Ucayali:** Prov. Colonel. Portillo, Dist. Calleria, forestry breeding area, Km 4, *R. L. Magin* 70 (NY, USM).

10. *Swartzia polita* (R. S. Cowan) Torke, comb. et stat. nov. Basionym: *Swartzia flaemingii* var. *polita* R. S. Cowan, Proc. Biol. Soc. Wash. 86: 455–456. 1973. TYPE: Brazil. Bahia: Maraú, 12 Jan. 1967 (fl), *R. P. Belém & R. S. Pinheiro* 3078 (holotype, US 2639671; isotypes, CEPEC, NY).

Swartzia flaemingii var. *cognata* R. S. Cowan, Proc. Biol. Soc. Wash. 86: 456. 1973. Syn. nov. TYPE: Brazil. Bahia: Coarací, 30 Nov. 1966 (fl), *R. P. Belém & R. S. Pinheiro* 2944 (holotype, US 2639670; isotype, NY).

Cowan (1968) erected *Swartzia* ser. *Acutifoliae* R. S. Cowan for an apparently natural assemblage of species that have five to 20 leaflet pairs, white corollas, the style shorter than the ovary, the ovary stipe shorter than or not more than $1.25 \times$ the length of the ovary, and broadly elliptical, usually multi-seeded fruits, with the seeds partially covered by yellow arils. Most of the ca. 20 species assignable to the series have bracteolate pedicels. The series is distributed primarily in coastal rainforest and restinga areas of eastern Brazil and, to a lesser extent, in dry, seasonal, and riparian forests and cerrado regions of central Brazil, with some species occurring as far north as the southern tributaries of the Amazon river in Pará and as far west as eastern Bolivia. Many of the taxa in series *Acutifoliae*, especially in eastern Brazil, are geographically restricted endemics. A scarcity of collections from much of the geographic range of the series precluded a detailed analysis of morphological variation by Cowan (1968, 1973, 1981), and as a result, a number of distinct species were either not recognized or were treated as varieties of *S. acutifolia* Vogel, *S. flaemingii* Raddi, or *S. macrostachya*

Bentham. Inadequate sampling also led to the opposite error, the inference of morphological discontinuities where none actually existed. While some of these problems were corrected by Mansano and Tozzi (1999, 2001), several others remain to be addressed, and a thorough revisionary study of the series throughout its geographic range is sorely needed.

Among the five varieties of *Swartzia flaemingii* recognized by Cowan (1968, 1973), variety *polita* and variety *cognata* are unique in the morphology of their leaves (mostly 12- to 20-jugate, with the rachis winged and the leaflets narrowly oblong, marginally revolute, coriaceous, glabrous and usually highly lustrous on the adaxial surface, and appressed-pubescent on the abaxial surface) and in having (4 to) 6 to 14 large stamens. In addition to these characters, these two varieties differ from the typical variety of *S. flaemingii* in the pedicels 12–22 mm long (vs. 5–10 mm long) and the bracteoles less than 1 mm long (vs. 1.5–3 mm long). In the original publication (Cowan, 1973), the two varieties, each known at the time from only a single collection, were separated by the leaflets being more conspicuously revolute and lustrous above and more densely pubescent beneath in variety *polita*, and by the greater number of larger stamens in variety *cognata* (10 to 12 vs. 4 to 6 in var. *polita*). With recent collections bridging the morphological discontinuities between the type specimens, the varietal names are no longer tenable, and a single taxon, *S. polita*, is recognized. The species is known only from a narrow strip of coastal rainforest and restinga vegetation in the Brazilian state of Bahia, between Salvador and the border with the state of Espírito Santo.

Specimens examined. BRAZIL. **Bahia:** Camaçari–Canavieiras road, 25 km E of Camaçari, Faz. Santa Terezinha, *J. Almeida & T. S. Santos* 235 (CEPEC); Mun. Belmonte, Belmonte–Itapebi rd., 30 km SW of Belmonte, *B. M. Torke et al.* 163 (CEPEC, MO); Mun. Cairú, Nilo Peçanha–Cairú rd., Km 2, *A. M. Carvalho et al.* 362 (CEPEC); Mun. Coarací, *R. P. Belém & R. S. Pinheiro* 2944 (NY, US); Mun. Ilhéus, W portion of Mata da Esperança, access Ilhéus–Itabuna rd., Banco da Vitória, *J. G. Jardim et al.* 2600 (CEPEC, NY); Faz. Nossa Senhora de Fátima, Km 2 of rd. to Japu, *L. A. Mattos Silva et al.* 3523 (CEPEC); Mun. Ipiatú, rd. to Jequié, *T. S. Santos* 1208 (CEPEC, US); Mun. Itacaré, *T. S. Santos* 1070 (CEPEC, US); Itacaré–Maraú rd., Km 4, *Mattos-Silva et al.* 4356 (NY); Mun. Maraú, Maraú–Campinhos rd., Km 1, *G. P. Lewis & A. M. de Carvalho* 1019 (NY, US); Ubaitaba–Maraú rd., 45.5 km E of Ubaitaba, *J. G. Jardim et al.* 2605 (CEPEC, MO, NY, US); Ubaitaba–Campinhos rd., Km 60–62, *T. S. Santos et al.* 4547 (CEPEC); Mun. Porto Seguro, Res. Biol. do Pau-Brasil, *A. Eupunino* 62 (CEPEC, US); Mun. Santa Cruz Cabrália, Est. Ecol. Pau-Brasil, ca. 16 km W of Porto Seguro on Hwy. BR-367, Parque Zoobotânico, *F. S. Santos* 222 (CEPEC); Mun. Teixeira de Freitas, Alcobaça, *T. S. Santos* 937 (CEPEC, US); Mun. Urucuca, Urucuca–Taboquinha rd., *T. S. Santos* 2199 (CEPEC, NY, US); 7.3 km N of Serra

Grande on rd. to Itacaré, W. W. Thomas *et al.* 7522 (CEPEC, NY).

11. *Swartzia riedelii* R. S. Cowan, Fl. Neotrop. Monogr. 1: 161–162. 1968. TYPE: Brazil, Bahia: near Ilhéus, Jan. 1822 (fr), *L. Riedel* 607 (holotype, LE not seen; isotypes, NY, US).

Swartzia peremarginata R. S. Cowan, Proc. Biol. Soc. Wash. 86: 457–458. 1973. Syn. nov. TYPE: Brazil, Bahia: Mun. Una, margin of Una–Olivença rd. (BA-001), 1 June 1966 (fr), *R. P. Belém* & *R. S. Pinheiro* 2377 (holotype, NY; isotypes, CEPEC, US).

Swartzia ser. *Tounateae* is represented in the Atlantic coastal forest of eastern Brazil primarily by a morphologically variable complex with mostly glabrous gynoecea. Within this group, Cowan (1968, 1973) recognized four varieties of *S. apetala* Raddi and two other species, *S. riedelii* and *S. peremarginata*. Mansano and Tozzi (1999) reduced the number of varieties of *S. apetala* to two (*S. apetala* var. *apetala* and *S. apetala* var. *glabra* (Vogel) R. S. Cowan), though their analysis was restricted mostly to the southern half of the distribution of the complex. Two other species of series *Tounateae* with densely pubescent gynoecea, *S. capixabensis* Mansano, known from a single collection from Espírito Santo, and *S. pilulifera* Benth. of Minas Gerais and Rio de Janeiro, appear to be quite distinct from other members of the series in eastern Brazil.

Cowan (1968) described *Swartzia riedelii* from a single flowering collection from coastal Bahia. He distinguished it from other species in series *Tounateae* by the rachis not winged, the leaflets abaxially tomentose, and the basal portion of the gynoeceum sparsely villous-pubescent. A fruiting collection, also from coastal Bahia and reportedly differing in having rigid, obovate, deeply emarginate leaflets (vs. apically short-acuminate) and regular calyx segments with thickened, relatively well-differentiated margins (vs. irregular segments), was described as *S. peremarginata* (Cowan, 1973). Additional collections examined by the present author are quite variable in the shape of the leaflet apex, with some collections having both emarginate and short-acuminate leaflets (e.g., Thomas *et al.* 10961; Torke *et al.* 154). Contrary to Cowan's (1973) assertion that the calyx of *S. peremarginata* is regularly divided into well-defined segments, the calyces of specimens assignable to either name split open in an irregular fashion as in most other species of *Swartzia*. Finally, the presence of sparse pubescence on the ovary stipe and base of the ovary was noted in a number of collections; this character shows little correlation with other supposedly diagnostic features. With the elimination of any taxonomically significant

differences between *S. riedelii* and *S. peremarginata*, the older name, *S. riedelii*, is retained for a single species known from coastal white-sand restingas between Ilhéus and Cananvieiras, Bahia.

Specimens examined. BRAZIL. **Bahia:** Mun. Canavieiras, Canavieiras–Santa Luzia rd., *A. A. Amorim et al.* 2113 (NY); Mun. Eunápolis, *A. J. Ribeiro et al. s.n.* (CEPEC); Mun. Ilhéus, 10 km S of Ilhéus (Pontal) on rd. to Olivença, then 3 km W, Faz. Manquinho, W. W. Thomas *et al.* 10194 (MEXU, NY, US); rd. to Marium (off rd. to Vila Brasil), 8.9 km SW of Olivença, W. W. Thomas *et al.* 10961 (NY); Faz. Barra do Manguinho, Ilhéus–Olivença rd. (BA-001), Km 11, *R. Voeks* 12 (CEPEC); Olivença–Vila Brasil rd., Km 3, near Faz. Cururupitangal, *L. A. Mattos Silva et al.* 1725 (CEPEC); Olivença, *T. S. Santos* 2856 (CEPEC, US); Olivença–Serra das Trempeas rd., 6 km from Olivença, W. W. Thomas *et al.* 9715 (NY); Mun. Una, rd. to Distr. de Pedras, ca. 7 km past jct. with BA-001, *B. M. Torke et al.* 154 (CEPEC, MO); BA-001, 26 km S of Olivença, *S. A. Mori & F. P. Benton* 13268 (CEPEC, US); BA-001, just N of bridge on Rio Acupé, ca. 30 km S of Ilhéus, *S. A. Mori et al.* 16621 (CEPEC, NY, US); Una Biol. Res., headquarters, km 46 of Ilhéus–Una rd. (BA-001), *A. M. Amorim et al.* 1626 (NY, US); Una Biol. Res., near Picada do Principe, *A. M. Amorim et al.* 1728 (NY); Una Biol. Res., along Rio Marium, *A. M. Carvalho et al.* 6465 (CEPEC, NY); Olivença–Una rd. (BA-001), Km 35, ca. 1 km S of entrance to Una Biol. Res., *J. L. Hage & E. B. dos Santos* 826 (CEPEC).

12. *Swartzia rosea* Martius ex Benth. in Martius, Fl. Bras. 15(2): 32. 1870. TYPE: Colombia. Amazonas/Caqueta: Cataract Araracuara, Jan.–Feb. 1820 (fl), *C. F. P. von Martius* 3137 (holotype, M).

Swartzia benthamiana var. *yatuensis* R. S. Cowan, Fl. Neotrop. Monogr. 1: 137. 1968. Syn. nov. TYPE: Venezuela. Amazonas: uppermost Río Yatua, 100–140 m, 12 Dec. 1953 (fl), *B. Maguire et al.* 36753 (holotype, US 2253838; isotype, NY).

The *Swartzia benthamiana* complex (including *S. benthamiana* Miquel, *S. laevicarpa* Amshoff, *S. rosea*, *S. cupavenensis*, *S. fanshawei* R. S. Cowan, *S. triptera* Barneby, *S. lamellata*, *S. kaieteurensis*, *S. tomentifera* (Ducke) Ducke, and *S. ulei* Harms) is a morphologically cohesive group found throughout much of lowland Amazonia and the Guianas. It can be distinguished from other species groups within *Swartzia* by the combination of ramiflorous inflorescences, a white petal, 2 to 4 larger stamens, and a pubescent gynoeceum, with the ovary broadly ellipsoid, longer than the style, and about as long as or slightly shorter than the ovary stipe. Most species lack bracteoles and have mostly single-seeded fruits that are more or less elliptical. Morphological diagnosis of species within the complex is based on combinations of subtle character states and is complicated by the presence of occasional intermediate individuals.

As recognized here, *Swartzia rosea* is a widespread, variable taxon that occurs across much of western Amazonia, from eastern Ecuador and Colombia and the Venezuelan state of Amazonas south to the Loreto region of Peru and Acre, Brazil, and east to central Amazonas, Brazil. It is closely related to *S. benthamiana*, *S. laeviscarpa*, and *S. cuparensis*. Although it was treated as a synonym of *S. benthamiana* by Cowan (1968), *S. rosea* differs notably from that species in its fruits, which are papillate or tuberculate in *S. rosea* versus coarsely rugose (i.e., covered with oblique anastomosing ridges) in *S. benthamiana*. The leaflets of *S. rosea* are glabrescent beneath, while those of *S. benthamiana* are usually strigulose. *Swartzia rosea* differs from *S. laeviscarpa* most conspicuously in its flower buds, which are globose, densely pubescent, and often verrucose (vs. apically umbonate, glabrescent to sparsely pubescent, and smooth surfaced in *S. laeviscarpa*). In addition to these differences, the geographic distribution of *S. rosea* is completely separated from that of *S. benthamiana* of the Guianas and the northeastern Amazon basin of Brazil and is largely separated from that of *S. laeviscarpa* of the Rio Negro and central Amazon basins of Brazil, although the distributions of the latter pair overlap somewhat in western Amazonas, where occasional intermediate individuals occur. Less impressive are the differences between *S. rosea* and *S. cuparensis* of the upper Rio Orinoco basin of Venezuela. The latter species typically has smooth-surfaced (vs. verrucose) flower buds and revolute-margined leaflets, which are minutely strigulose (vs. glabrescent) beneath.

Cowan's (1968) description of *Swartzia benthamiana* var. *yatuensis* was based on a flowering collection from Amazonas state of southern Venezuela with notably large leaves and conspicuous leaflet venation. These characters display substantial variation across the ranges of both *S. benthamiana* and *S. rosea*. The glabrous leaves of the type collection of var. *yatuensis* and the tuberculate pods of subsequent collections from the same geographic region suggest conspecificity with *S. rosea*.

Specimens examined. BRAZIL. **Acre:** Mun. Cruzeiro do Sul, RADAM Project, L. R. *Marinho* 128 (US); BR-364, Ramal do Pentecoste, Km 10, near Assis Brasil, P. J. M. *Maas et al.* 9189 (NY). **Amazonas:** mouth of Rio Jutai, A. *Ducke* 20352 (US); Rio Curicuriari, summit of Serra Curicuriari, R. E. *Schultes* & F. *López* 9840A (US); Mun. Fonte Boa, Paraná do Mamupina (tributary of lt. margin Paraná Mineruá), Varadouro Ponta da Ariramba, C. A. *Cid Ferreira et al.* 8389 (MO, NY, US); Mun. Novo Japurá, betw. Tamandaré & Manguari, along Rio Japurá, C. A. *Cid Ferreira* & J. *Lima* 3627 (MO, NY, US); Vila Biltencourt, confl. of Rio Japurá & Rio Apaporis, C. A. *Cid Ferreira* & J. *Lima* 3687 (MO, NY); Mun. São Paulo de Olivença, São Paulo de Olivença, A. *Ducke* 1029 (MO, NY, US); rd. to Bonfim, just outside of São Paulo de Olivença, H. C. *Lima et al.* 2768

(MO, NY, US); basin of Rio Solimões, near Palmares, B. A. *Krukoff* 8558 (MO, NY, US); basin of Creek Belem, basin of Rio Solimões, B. A. *Krukoff* 8990 (MO, NY, US). COLOMBIA. **Amazonas:** Rio Caquetá, A. *Ducke* 12231 (US); Rio Apaporis, Soratama, betw. Rio Cananari & Rio Pacoa, H. *García-Barriga* 14104 (NY, US); Rio Apaporis, vic. Cachi-vera de Jirijirino, R. E. *Schultes* & I. *Cabrera* 12974 (US); Mun. Araracuara, Rio Caquetá, rt. margin, 3 km above Isla Sumacta, E. *Alvarez et al.* 707 (NY); Mun. Tarapaca, corr. Tarapacá, Parq. Nac. Nat. Amaycayacu, Lorena Sector, Rio Cotuhé, A. *Rudas et al.* 4456 (MO). **Vaupés:** Rio Paca (tributary of Rio Papuri), Wacaricuara & vic., R. E. *Schultes* & I. *Cabrera* 19533 (US); Mun. Mitú, Mitú & vicinity, along Rio Vaupés, betw. Rio Yí & Rio Kubiýú, J. L. *Zaruchi et al.* 1829 (MO, US); Rio Vaupés, below Urania, M. P. *Galeano et al.* 1844 (MO). ECUADOR. **Napo:** Cant. Joya de Los Sachas, comm. Pompeya, S side of Rio Napo, encampment of Maxus, Km 5–7, A. *Grijalva* & G. *Grefa* 304 (MEXU). PERU. **Loreto:** Maynas, La Colpa, Rio Yulineto (tributary of Rio Putumayo), C. *Haxaire* 3682 (MO); Yanamono Explorama Tourist Camp, Rio Amazonas, A. H. *Gentry et al.* 42831 (AMAZ, MO); Dist. Las Amazonas, Explornapo Camp, near Sucusari, along Rio Napo, J. *Pipoly et al.* 13827 (MO, USM); Dist. Iquitos, Allpahuayo-Mishana Res. Zone, IAP Exp. Stat., 20 km S of Iquitos, on Iquitos–Nauta rd., R. *Vásquez* & N. *Jaramillo* 15261 (MEXU, MO, NY, USM); Mishana, Rio Nanay, halfway betw. Iquitos & Santa Maria de Nanay, A. H. *Gentry et al.* 39079 (MO, USM); Puerto Almendras, property of Univ. de la Amazonía Peruana, Rio Nanay, B. M. *Torke et al.* 262 (AMAZ, MO); Prov. Mariscal Ramón Castilla, Rio Esperanza, R. *Vásquez* & N. *Jaramillo* 7311 (AMAZ, MO); Prov. Requena, Dist. Saquena, Rio Ucayali, Quebrada de Aucayacu, above Genaro Herrera, M. *Rimachi* Y. 4286 (AMAZ, MO, USM). VENEZUELA. **Amazonas:** Mun. Rio Negro, Rio Siapa, 500 m NE of mouth of Caño Chimoni, G. *Aymard et al.* 10078 (MO, NY); middle part of Rio Baria, J. S. *Miller* & G. *Davidse* 1641 (MO, NY, US); upper Rio Baria, A. H. *Gentry* & B. A. *Stein* 17299 (MO, NY); swamp forest draining into Rio Baria from Rio Mawarinuma, W. W. *Thomas et al.* 3417 (NY, US); Rio Mawarinuma, 1–4 km E of Cerro NeblinaBase Camp, R. *Liesner* & V. *Funk* 15817 (MO, NY, US); Rio Pacimoni, J. *Velazco* 2053 (MO); uppermost Rio Yatua, B. *Maguire et al.* 36753 (NY); San Carlos de Rio Negro–Solano rd., ca. 4 km from San Carlos de Rio Negro, P. *Berry* & G. *Aymard* 7027 (MO).

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